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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/796,895

03/08/2004

Georgios B. Giannakis

1008-011US01

1645

28863 7590 04/17/2008  
SHUMAKER & SIEFFERT, P. A.  
1625 RADIO DRIVE  
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EXAMINER

TORRES, JUAN A

ART UNIT

PAPER NUMBER

2611

NOTIFICATION DATE

DELIVERY MODE

04/17/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@ssiplaw.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/796,895	<b>Applicant(s)</b> GIANNAKIS ET AL.	
	<b>Examiner</b> JUAN A. TORRES	<b>Art Unit</b> 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3,5-19,21,23-27 and 29-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,3,5-19,21,23-29 and 33 is/are allowed.
- 6) ☒ Claim(s) 30 is/are rejected.
- 7) ☒ Claim(s) 31 and 32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>02/14/2008</u>  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

The information disclosure statement (IDS) submitted on 02/14/2008 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Drawings***

The modifications to the drawings were received on 02/14/2008. These modifications are accepted by the Examiner.

In view of the amendment filed on 02/14/2008, the Examiner withdraws Drawing objections of the previous Office action.

### ***Specification***

The modifications to the specification were received on 02/14/2008. These modifications are accepted by the Examiner.

In view of the amendment filed on 02/14/2008, the Examiner withdraws Specification objections of the previous Office action.

### ***Claim Objections***

The modifications to the claims were received on 02/14/2008. These modifications are accepted by the Examiner.

In view of the amendment filed on 02/14/2008, the Examiner withdraws claims objections to claim 13 of the previous Office action.

### ***Response to Arguments***

Applicant's arguments filed 01/14/2008 have been fully considered but they are not persuasive.

Regarding claim 30:

The Applicant contends:

“LeMartre fails to make any mention of generating a stream of frames where the frames corresponding to different blocks of symbols are interleaved. Further, LeMartret fails to disclose transmitting a signal according to interleaved frames produced by blocks of symbols. Instead, LeMartret teaches transmitting a signal according to a set of chips produced by blocks of symbols. In addition, the LeMartret reference discloses recovering symbols by converting the received signal into chips. However, LeMartret does not describe producing symbols from a received signal by de-interleaving frames. The Zhou reference fails to make any mention of generating a stream of chips from a stream of frames. Furthermore, Zhou fails to disclose transmitting a signal according to interleaved chips generated from interleaved frames produced by blocks of symbols. Instead, Zhou teaches transmitting a signal according to interleaved chips produced by blocks of symbols. In addition, the Zhou reference discloses recovering symbols by converting the received signal into chips. However, Zhou does not describe producing symbols from a received signal by de-interleaving chips and frames. Moreover, a person of ordinary skill in the art would find no rational reason to modify the LeMartret reference with the Zhou reference. Both LeMartret and Zhou teach transmitting a signal according to a set of chips produced by blocks of symbols and recovering symbols by converting the received signal into chips. The combined references fail to teach Applicant's invention as claimed. For example, neither LeMartret nor Zhou make any mention of transmitting a signal according to interleaved chips generated from interleaved frames produced by blocks of symbols. In addition, neither of the cited references contemplates receiving a signal and de-interleaving chips and frames to produce the blocks of symbols”

The Examiner disagrees, and asserts that, as indicated in the previous Office action, Le Martret a wireless transmitter to transmit an ultra wideband (UWB) signal according to interleaved frames produced by blocks of information bearing symbols, in section 2.1 and figure 3, Le Martret discloses multiuser spreading, specifically “In PPM-IRMA, each user (say the  $m$ -th) transmits each information symbol  $s_m(q)$  drawn from the alphabet  $\{0, 1, \dots, A-1\}$  repeatedly over  $N_f$  frames each of duration  $T_f$ ... The code  $c_m(k)$  is a periodic pseudo-random sequence with period  $P_E$ . We will restrict this period

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to be an integer multiple of the number of frames, i.e.,  $PE = K N f$ . Such a block-periodic code that will be adopted henceforth, implies a block spreading operation where each block of  $K$  information bearing symbols  $\{s_m(qK), s_m(qK + 1), \dots, s_m((q + 1)K - 1)\}$  is spread by the same hopping sequence over  $K N f$  frames”.

This multiuser spreading operation is equivalent to symbol-spreading followed by frame interleaving, see provisional application 60453809 page 13 left column last paragraph that states “The MU spreading by  $D_u$  can then be viewed as symbol-spreading followed by frame-interleaving, as shown in Fig. 5; similarly, the MU despreading by  $D_u$  can be viewed as frame-deinterleaving followed by block-despreading”

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

For these reasons and the reason stated in the previous Office Action, the rejection of claim 30 is maintained.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Le Martret ("All-Digital Impulse Radio for MUI/ISI-Resilient Transmissions through Frequency-Selective Multipath Channels," Proc. of MILCOM Conf., Los Angeles, CA, Oct. 22-25, 2000) in view of Zhou ("Chip-Interleaved Block-Spread Code Division Multiple Access," IEEE Transactions on Communications, vol. 50, no. 2, pp. 235-248, February 2002) (Le Martret is co-author of this paper).

Regarding claim 30, Le Martret discloses a wireless transmitter to transmit an ultra wideband (UWB) signal according to interleaved frames produced by blocks of information bearing symbols (section 2.1 and figure 3, multiuser spreading, that is equivalent to symbol-spreading followed by frame interleaving, see response to argument above and provisional application 60453809 page 13 left column last paragraph, that states "The MU spreading by Du can then be viewed as symbol-spreading followed by frame-interleaving, as shown in Fig. 5; similarly, the MU despreading by Duo can be viewed as frame-deinterleaving followed by block-despreading"); and a wireless receiver to receive the UWB signal and de-interleave frames to produce estimate symbols (section 2.1 and figure 3). Le Martret doesn't disclose that the chips are interleaved and de-interleaved. Zhou discloses generating a stream of chips from the stream of frames, where the chips corresponding to different frames are interleaved in the transmitter and de-interleaved in the receiver (abstract; introduction 3<sup>rd</sup> paragraph; and section III CIBS-CDMA transceiver design figure 4). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been

obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the chip interleaving disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3<sup>rd</sup> paragraph).

***Allowable Subject Matter***

Claims 31 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 1, 3, 5-19, 21, 23-27, 29 and 33 are allowed.

The following is an examiner's statement of reasons for allowance: claims 1, 3, 5-19, 21, 23-27, 29 and 33 are allowed because a comprehensive search of prior art failed to teach, either alone or in combination, generating a stream of frames from blocks of information bearing symbols by applying an orthogonal set of spreading codes to the blocks of symbols to form the frames and interleaving the frames corresponding to different blocks of symbols to form the stream of frames, generating a stream of chips from the stream of frames applying an orthogonal set of time-hopping spreading codes to the interleaved frames to form the chips and interleaving the chips corresponding to different frames to form the stream of chips, and outputting an ultra wideband (UWB) transmission signal from the stream of chips, as the applicant has claimed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

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accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Raaf (US 7187699 B1) discloses frame interleaving in figures 2, 3, 4 and 6.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is 571-272-3119. The examiner can normally be reached on 8-6 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Juan Alberto Torres  
3-19-2008

/Mohammad H Ghayour/  
Supervisory Patent Examiner, Art Unit 2611